MATERIAL SAFETY DATA SHEET

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SRM Number: 3011
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SRM Name: 1,1,1-Trichloroethane in Methanol

Date of Issue: 12 January 2006

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SECTION I. MATERIAL IDENTIFICATION

Material Name: 1,1,1-Trichloroethane in Methanol

Description: SRM 3011 consists of two 5-milliliter sealed borosilicate glass ampoules, each containing approximately 2.5 mL of a solution of 1,1,1-trichloroethane in methanol.

Other Designations: **1,1,1-Trichloroethane** (methyltrichloromethane; alpha-trichloroethane; methylchloroform; trichloromethylmethane; methyl chloroform; trichloroethane) in **Methanol** (methyl alcohol; wood alcohol; methyl hydroxide; carbinol; monohydroxymethane; wood spirit; wood naphtha; methylol)

Name	Chemical Formula	CAS Registry Number
Methanol	CH_3OH	67-56-1
1,1,1-Trichloroethane	CH_3CCl_3	71-55-6

DOT Classification: Methanol; UN1230; Packing Group II; Hazard Class 3.

SECTION II. HAZARDOUS INGREDIENTS

Hazardous Components	Nominal Concentration (%)	Exposure Limits and Toxicity Data
Methanol	99	OSHA TWA: 260 mg/m^3 (200 ppm)
		NIOSH recommended TWA (skin): 260 mg/m^3 (200 ppm) (10 h)
		NIOSH recommended STEL (skin): 325 mg/m^3 (250 ppm)
		UK WEL TWA (skin): 266 mg/m^3 (200 ppm)
		UK WEL STEL (skin): 333 mg/m^3 (250 ppm)
		Human, Inhalation TC_{LO}: 86 000 mg/m^3
		Human, Oral LD_{LO}: 143 mg/kg
		Man, Oral TD_{LO}: 3 429 mg/kg
1,1,1-Trichloroethane	1	OSHA TWA: 1 900 mg/m^3 (350 ppm)
		ACGIH TWA: 350 ppm
		ACGIH STEL: 450 ppm
		NIOSH recommended ceiling: 1 900 mg/m^3 (350 ppm) (15 min)
		UK WEL TWA: 555 mg/m^3 (100 ppm)
		UK WEL STEL: 1110 mg/m^3 (200 ppm)
		Human, Inhalation TC_{LO}: 2 730 mg/ m^3 (7 h)
		Man, Inhalation TC_{LO}: 350 ppm
		Human, Oral TD_{LO}: 670 mg/kg
		Rat, Oral LD_{50}: 9 600 mg/kg

Carcinogenic, Tumorigenic, Mutagenic Reproductive Data: 1,1,1-Trichloroethane has been investigated as a reproductive and mutagenic effector. Methanol has been investigated as a mutagenic and reproductive effector.

SECTION III. PHYSICAL/CHEMICAL CHARACTERISTICS

Methanol	1,1,1-Trichloroethane
Appearance and Odor: a clear, colorless liquid with a characteristic alcoholic odor	**Appearance and Odor:** a clear, colorless liquid with a sweet odor
Relative Molecular Mass: 32.04	**Relative Molecular Mass:** 133.40
Density: 0.7914 g/m^3	**Density:** 1.3390 g/m^3
Boiling Point: 65 °C (149 °F)	**Boiling Point:** 74 °C (165 °F)
Freezing Point: –94 °C (–137 °F)	**Freezing Point:** –32 °C (–26 °F)
Vapor Pressure (@ 20 °C): 97.25 mmHg	**Vapor Pressure (@ 20 °C):** 100 mmHg
Evaporation Rate (butyl acetate = 1): 4.6	**Evaporation Rate (butyl acetate = 1):** 5.0
Viscosity (@ 20 °C): 0.59 cP	**Viscosity (@ 20 °C):** 0.858 cP
Solubility in Water: soluble	**Solubility in Water (@ 25 °C):** 0.078 %
Solvent Solubility: soluble in ether, benzene, alcohol, acetone, chloroform, ethanol, ketones, and most organic solvents	**Solvent Solubility:** soluble in acetone, benzene, chloroform, methanol, ethanol, carbon disulfide, ether, carbon tetrachloride, and heptane

NOTE: The physical and chemical data provided are for the pure components. Physical and chemical data for this methanol/1,1,1-trichloroethane solution do not exist. The actual behavior of the solution may differ from the individual components.

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Methanol

Flash Point: 11 °C **Method Used:** Closed Cup

Autoignition Temperature: 385 °C

Flammability Limits in Air (Volume %): **UPPER:** 36
LOWER: 6.0

1,1,1-Trichloroethane

Flash Point: > 93.3 °C **Method Used:** Not available.

Autoignition Temperature: 537 °C

Flammability Limits in Air (Volume %): **UPPER:** 12.5
LOWER: 7.5

Unusual Fire and Explosion Hazards: Methanol is a severe fire hazard. Vapors are heavier than air and may travel a considerable distance to a source of ignition and flash back. Vapor and air mixtures are explosive. 1,1,1-Trichloroethane is a slight fire hazard.

Extinguishing Media: Use alcohol-resistant foam, regular dry chemical, carbon dioxide, or water spray.

Special Fire Procedures: Fire fighters should wear a self-contained breathing apparatus (SCBA) with a full face piece in the pressure demand or positive mode and other protective clothing.

SECTION V. REACTIVITY DATA

Stability: **X** **Stable** ____ **Unstable**

Stable at normal temperatures and pressure.

Conditions to Avoid: Avoid contact with heat, sparks, flames, or other sources of ignition. Avoid inhalation of vapors or combustion by-products.

Incompatibility (Materials to Avoid): This material is incompatible with halo carbons, combustible materials, metals, oxidizing materials, halogens, metal carbide, amines, acids, and bases.

See Section IV**: "**Unusual Fire and Explosion Hazards".

Hazardous Decomposition or Byproducts: Thermal decomposition products may include toxic oxides of carbon, halogenated compounds, chlorine, hydrogen chloride, and various organic fragments.

Hazardous Polymerization: ____ **Will Occur** **X** **Will Not Occur**

SECTION VI. HEALTH HAZARD DATA

Route of Entry: **X** **Inhalation** **X** **Skin** **X** **Ingestion**

Methanol: Methanol is a skin and eye irritant and can cause nerve damage. This material is harmful if inhaled or absorbed through skin. Ingestion may be fatal or cause blindness. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Exposure can cause damage to the eyes, liver, heart, and kidneys. Methanol may also cause gastrointestinal disturbances and convulsions.

1,1,1-Trichloroethane: 1,1,1-Trichloroethane may be harmful by inhalation, ingestion, or skin contact. Eye contact of 1,1,1-trichloroethane vapors at 500 ppm may cause irritation and redness. Eye contact of liquid 1,1,1-trichloroethane may cause temporary injury. Repeated or prolonged contact with irritants may cause conjunctivitis. Direct contact to skin may cause irritation and redness. Repeated contact may produce dermatitis and possible burns. Exposure by inhalation to 500 ppm for 60 min of 1,1,1-trichloroethane should cause no effects except for a distinctive odor. Exposure to 900 ppm to 1000 ppm for 20 min may cause mild respiratory tract irritation. Ingestion of 1,1,1-trichloroethane may cause lung damage if aspirated into the lungs and may be fatal. Death may occur from chronic respiratory failure.

Medical Conditions Generally Aggravated by Exposure: 1,1,1-Trichloroethane exposure may aggravate heart or cardiovascular disorders, kidney disorders, liver disorders, skin disorders, and allergies. M**ethanol** may cause eye disorders, kidney disorders, skin disorders, and allergies.

Target Organ(s) of Attack: Central nervous system (CNS).

Listed as a Carcinogen/Potential Carcinogen (Methanol):

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens		X
In the International Agency for Research on Cancer (IARC) Monographs		X
By the Occupational Safety and Health Administration (OSHA)		X

Listed as a Carcinogen/Potential Carcinogen (1,1,1-Trichloroethane):

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens		X
In the International Agency for Research on Cancer (IARC) Monographs		X
By the Occupational Safety and Health Administration (OSHA)		X

EMERGENCY AND FIRST AID PROCEDURES:

Skin Contact: Remove contaminated shoes and clothing. Rinse affected area with large amounts of water followed by washing the area with soap and water. Watch for chemical irritations and treat them accordingly. Obtain medical assistance if necessary.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 minutes. Obtain medical assistance.

Inhalation: If inhaled, move the victim to fresh air. If breathing is difficult, give oxygen; if the victim is not breathing, give artificial respiration by qualified personnel. Obtain medical assistance if necessary.

Ingestion: If ingested, obtain medical assistance immediately.

SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material Is Released or Spilled: DO NOT touch spilled material. Reduce vapors with water spray. Avoid heat, flames, sparks, and other sources of ignition. Stop the leak if one can do so without risk. Absorb small spills with sand or other non-combustible absorbent material and place into containers for proper disposal.

Waste Disposal: Follow all federal, state, and local laws governing disposal. Methanol is subject to disposal regulations U.S. EPA 40 CFR 262, Hazardous Waste Number U154. 1,1,1-Trichloroethane is subject to disposal regulations U.S. EPA 40 CFR 262, Hazardous Waste Number U226.

Handling and Storage: Store and handle in accordance with all current regulations of standards. Keep methanol and 1,1,1-trichloroethane separated from incompatible substances. Persons handling this material must wear protective eyewear, clothing, and gloves to prevent contact with this material. Methanol is subject to storage regulations U.S. OSHA 29 CFR 1910.106.

Sealed ampoules of SRM 3011 should be stored in the dark at temperatures between 10 °C and 30 °C. Protect containers from physical damage.

SECTION VIII. SOURCE DATA/OTHER COMMENTS

Sources: MDL Information Systems, Inc., MSDS *Methyl Chloroform*, 16 June 2005.
MDL Information Systems, Inc., MSDS *Methyl Alcohol*, 16 June 2005.

Disclaimer: Physical and chemical data contained in this MSDS are provided only for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data on the MSDS. The certified value for this material is given in the NIST Certificate of Analysis.